Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte CHARLES S. PALM and RAYMOND McLAINE

Appeal No. 1999-0296
Application No. 08/483,552

ON BRIEF

Before THOMAS, RUGGIERO, and BARRY, Administrative Patent Judges.

BARRY, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the rejection of claims 1-16. We affirm-in-part.

BACKGROUND

The invention at issue in this appeal relates to three-dimensional ("3-D") images. When zooming-in on portions of 3-D images, a loss of depth perception ensues. Much of the loss relates to the issue of "disparity." Disparity is a measure

of the displacement between corresponding points of an image presented to a viewer's left eye vis-á-vis points on an image presented to his right eye. At some point, the disparity becomes so great that the viewer is incapable of recognizing depth and fusing the two images into a single 3-D view.

The appellants seek to overcome these problems by allowing a viewer to adjust the disparity between corresponding points on right and left image planes. When zooming in on an object with a stereo camera pair, the shift in focal length accompanying the zoom is accompanied by a simultaneous shift in disparity so that the stereo effect is not lost when a target object is very close, a moderate distance, or very far from the cameras. Camera separation is changed as a function of target distance to maintain a fixed fraction of the target distance as a default.

Claim 5, which is representative for our purposes, follows:

> 5. A method of maintaining disparity of a stereo pair of images within a range which avoids a loss of stereo effect without camera toe in while

> avoiding vertical shift between corresponding points of a left view and a right view of said stereo pair, comprising:
>
> maintaining the optical axes of a left camera and of a right camera substantially parallel, and
>
> adjusting disparity while adjusting distance to a target object to avoid loss of stereo effect.

The prior art applied in rejecting the claims follows:

Robinson	4,751,570	June 14, 1988
Anderson et al. (Anderson)	5,179,441	Jan. 12, 1993.

Claims 1-7 and 9-15 stand rejected under 35 U.S.C. § 103(a) as being obvious over Robinson in view of Anderson. Claim 8 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Robinson. Claim 16 stands rejected under § 103(a) as being obvious over Robinson. Rather than reiterate the arguments of the appellants or examiner in toto, we refer the reader to the briefs and answer for the respective details thereof.

OPINION

After considering the record, we are persuaded that the examiner erred in rejecting claims 1-4 and 6-16 but not in

rejecting claim 5. Accordingly, we affirm-in-part. We begin by noting the following principles from Rowe v. Dror, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997).

> A prior art reference anticipates a claim only if the reference discloses, either expressly or inherently, every limitation of the claim. See Verdegaal Bros., Inc. v. Union Oil Co., 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "[A]bsence from the reference of any claimed element negates anticipation." Kloster Speedsteel AB v. Crucible, Inc., 793 F.2d 1565, 1571, 230 USPQ 81, 84 (Fed. Cir. 1986).

We also note the following principles from In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993).

> In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a prima facie case of obviousness. In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).... "A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Bell, 991 F.2d 781, 782, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) (quoting In re Rinehart, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)).

Also, the references represent the level of ordinary skill in the art. See In re GPAC Inc., 57 F.3d 1573, 1579, 35 USPQ2d 1116, 1121 (Fed. Cir. 1995)(finding that the Board of Patent Appeals and Interference did not err in concluding that the

level of ordinary skill was best determined by the references of record); In re Oelrich, 579 F.2d 86, 91, 198 USPQ 210, 214 (CCPA 1978) ("[T]he PTO usually must evaluate ... the level of ordinary skill solely on the cold words of the literature."). Of course, "'[e]very patent application and reference relies to some extent upon knowledge of persons skilled in the art to complement that [which is] disclosed ....'" In re Bode, 550 F.2d 656, 660, 193 USPQ 12, 16 (CCPA 1977) (quoting In re Wiggins, 488 F.2d 538, 543, 179 USPQ 421, 424 (CCPA 1973)). Those persons "must be presumed to know something" about the art "apart from what the references disclose." In re Jacoby, 309 F.2d 513, 516, 135 USPQ 317, 319 (CCPA 1962). With these principles in mind, we consider the examiner's rejection and the appellants' argument regarding the following claims:

- claims 1, 2, 6, 9-11, and 14
- claims 3, 7, 8, 12, 15, and 16
- claims 4, 13
- claim 5.

We begin with claims 1, 2, 6, 9-11, and 14.

I. Claims 1, 2, 6, 9-11, and 14

The examiner asserts, "since Robinson discloses the controlled relationship between two parameters(1-camera base or separation and 2-object distance) and that since [sic] a fixed fractional relationship is met by slope of a straight line 'Y= **M***X+B' and clearly is the simplest relationship between two parameters, one of ordinary skill in the art would have been motivated to set up the system with a fixed fractional relationship in view of Robinson." (Examiner's Answer at 5-6.) The appellants argue, "Robinson does not teach or suggest maintaining the camera disparity at a fixed fraction of the distance of the scene." (Reply Br. at 6.)

Claims 1 and 2 specify in pertinent part the following limitations: "means for maintaining spacing between said left objective lens and said right objective lens a fixed fraction of a distance to a targeted object." Similarly, claim 6 specifies in pertinent part the following limitations: "a control mechanism, connected to said left camera, said right camera and said rangefinder, maintaining spacing between said

left camera and said right camera at a fixed fraction of a distance, specified by said rangefinder, to an object." Also similarly, claims 9-11 specify in pertinent part the following limitations: "maintaining spacing between said left camera and said right
camera at a fixed fraction of a distance to a targeted object." Further similarly, claim 14 specifies in pertinent part the following limitations: "using a left camera and a right camera with parallel optical axes and a range finder, maintaining spacing between said left camera and said right camera at a fixed fraction of a distance, specified by said rangefinder, to an object." Accordingly, claims 1, 2, 6, 9-11, and 14 require inter alia maintaining spacing between left and right cameras or left and right objective lenses at a fixed fraction of a distance to a targeted object.

The examiner fails to show a teaching or suggestion of the limitations in the applied prior art. "The range of sources available ... does not diminish the requirement for actual evidence. That is, the showing must be clear and particular. See, e.g., C.R. Bard, 157 F.3d at 1352, 48 USPQ2d

at 1232. Broad conclusory statements regarding the teaching of multiple references, standing alone, are not 'evidence.'" In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999)(citing McElmurry v. Arkansas Power & Light Co., 995 F.2d 1576, 1578, 27 USPQ2d 1129, 1131 (Fed. Cir. 1993) and In re Sichert, 566 F.2d 1154, 1164, 196 USPQ 209, 217 (CCPA 1977). Although couched in terms of combining prior art references, the same requirement applies in the context of modifying such references.

Here, the examiner admits, "Robinson, fails to specifically disclose maintaining spacing between the right and left objective lenses or cameras(22) at a fixed fraction of a distance to a targeted object ...." (Examiner's Answer at 6.) Although the reference teaches that "[i]t is particularly advantageous to be able to increase the camera base as object distances become greater[,]" col. 3, ll. 18-20, the examiner's broad, conclusory opinion of obviousness does not meet the requirement for actual evidence.

He fails to allege, let alone show, moreover, that Anderson cures the deficiency of Robinson. Because the latter reference does not disclose maintaining spacing between right and left objective lenses or cameras at a fixed fraction of a distance to a targeted object, we are not persuaded that the teachings from the applied prior art would have suggested the limitations of "means for maintaining spacing between said left objective lens and said right objective lens a fixed fraction of a distance to a targeted object[;]" "a control mechanism, connected to said left camera, said right camera and said rangefinder, maintaining spacing between said left camera and said right camera at a fixed fraction of a distance, specified by said rangefinder, to an object[;]" "maintaining spacing between said left camera and said right camera at a fixed fraction of a distance to a targeted object[;]" or "using a left camera and a right camera with parallel optical axes and a range finder, maintaining spacing between said left camera and said right camera at a fixed fraction of a distance, specified by said rangefinder, to an object." Therefore, we reverse the rejection of claims 1, 2,

6, 9-11, and 14 as being obvious over Robinson in view of Anderson. We proceed to claims 3, 7, 8, 12, 15, and 16.

II. Claims 3, 7, 8, 12, 15, and 16

The examiner asserts, “the Neutral Plane is clearly a point within the ‘”Tolerance Of Fusion Of Images’ [of Robinson].” (Examiner's Answer at 9.) The appellants argue, "Robinson has no teaching whatsoever of controlling the neutral plane when changing distance to the target image being captured." (Reply Br. at 3.)

Claim 3 specifies in pertinent part the following limitations: "means for adjusting the distance between said optical axes while adjusting focal length of the zoom lenses to hold a location of the neutral plane substantially constant." Similarly, claim 7 specifies in pertinent part the following limitations: "a control mechanism which adjusts disparity while adjusting focal length of the zoom lenses to hold a location of the neutral plane substantially constant.” Also similarly, claim 8 specifies in pertinent part the following limitations: “a control mechanism which adjusts

disparity to hold a location of the neutral plane substantially constant when the distance of the camera to the scene changes." Further similarly, claim 12 specifies in pertinent part the following limitations: "adjusting camera separation while adjusting the zoom lenses to hold a location of the neutral plane substantially constant." Similarly, claim 15 specifies in pertinent part the following limitations: "adjusting disparity while adjusting focal length of the zoom lenses to hold a location of the neutral plane substantially constant." Also similarly, claim 16 specifies in pertinent part the following limitations: " adjusting the effective distance between the optical axes of the objective lenses to hold a location of the neutral plane substantially constant when the distance of the objective lenses to the scene changes." Accordingly, claims 3, 7, 8, 12, 15, and 16 require inter alia holding a location of the neutral plane substantially constant.

The examiner fails to show a teaching or suggestion of the limitations in the applied prior art. He admits, "Robinson fails to provide the particular wording of Neutral

Plane ....” (Examiner’s Answer at 11.) Furthermore, the examiner’s broad, conclusory opinion that the claimed neutral plane is a point within Robinson’s tolerance of fusion of images does not meet the requirement for actual evidence.

He fails to allege, let alone show, moreover, that Anderson cures the deficiency of Robinson. Because the latter reference does not disclose a neutral plane, we are not persuaded that the teachings from the applied prior art disclose or would have suggested the limitations of “means for adjusting the distance between said optical axes while adjusting focal length of the zoom lenses to hold a location of the neutral plane substantially constant[;]” “a control mechanism which adjusts disparity while adjusting focal length of the zoom lenses to hold a location of the neutral plane substantially constant[;]” “a control mechanism which adjusts disparity to hold a location of the neutral plane substantially constant when the distance of the camera to the scene changes[;]” “adjusting camera separation while adjusting the zoom lenses to hold a location of the neutral plane substantially constant[;]” “adjusting disparity while

adjusting focal length of the zoom lenses to hold a location of the neutral plane substantially constant[;]" or "adjusting the effective distance between the optical axes of the objective lenses to hold a location of the neutral plane substantially constant when the distance of the objective lenses to the scene changes." Therefore, we reverse the rejection of claims 3, 7, 12, and 15 as being obvious over Robinson in view of Anderson; claim 8 as being anticipated by Robinson; and claim 16 as being obvious over Robinson. We proceed to claims 4 and 13.

III. Claims 4 and 13

The examiner asserts that Robinson discloses "means for adjusting the distance between said optical axes (or camera separation, which is "***a way***" of controlling disparity while adjusting **focal length of the zoom lenses**, to hold a location of the neutral plane substantially constant." (Examiner's Answer at 6.) The appellants argue, "Robinson does not teach or suggest linking zoom and disparity." (Reply Br. at 7.)

Claim 4 specifies in pertinent part the following limitations: "means for adjusting disparity while adjusting focal length of the zoom lenses to avoid loss of stereo effect." Similarly, claim 13 specifies in pertinent part the following limitations: "adjusting disparity while adjusting focal length of the zoom lenses to avoid loss of stereo effect." Accordingly, claims 4 and 13 require inter alia linking the adjustment of disparity with the adjustment of the focal length of zoom lenses of right and left cameras to avoid loss of stereo effect.

The examiner fails to show a teaching or suggestion of the limitations in the applied prior art. Robinson links the adjustment of several parameters of a camera. In one instance, "[p]arallel tracking of the zoom control, and focus control of the two camera lenses **14**, is achieved ...." Col. 2, ll. 8-9. "In a stereo-camera head which does not have a camera separation facility, a technique of auto-focus linked to camera convergence [is] proposed." Id. at ll. 46-48. Although the reference links the adjustment of these

parameters, it does not link the adjustment of disparity with the adjustment of the focal length of zoom lenses.

He fails to allege, let alone show, moreover, that Anderson cures the deficiency of Robinson. Because the latter reference does not link the adjustment of disparity with the adjustment of the focal length of zoom lenses, we are not persuaded that the teachings from the applied prior art would have suggested the limitations of "means for adjusting disparity while adjusting focal length of the zoom lenses to avoid loss of stereo effect" or "adjusting disparity while adjusting focal length of the zoom lenses to avoid loss of stereo effect." Therefore, we reverse the rejection of claims 4 and 13 as being obvious over Robinson in view of Anderson. We proceed to claim 5.

IV. Claim 5

The examiner assets, "[c]laim 5, is analyzed and discussed with respect to claims 1 and 8 above." The appellants argue, "claim 5 is a method which requires 'maintaining the optical axes of a left camera and of a right

camera substantially parallel, and adjusting disparity while adjusting distance to a target.' These limitations are simply not shown by the references." (Reply Br. at 10.)

Claim 5 specifies in pertinent part the following limitations: "maintaining the optical axes of a left camera and of a right camera substantially parallel," and "adjusting disparity while adjusting distance to a target object to avoid loss of stereo effect."

The prior art would have suggested the limitations. "FIG. 2 of [Robinson's] drawings shows diagrammatically a stereo-camera ...." Col. 3, ll. 21-22. It further shows that the stereo-camera includes left and right cameras (22). "The cameras **22** are provided with a means of mechanical alignment to enable accurate registration of the two camera images to be achieved." Id. at ll. 40-42. Figure 2, also, shows that the cameras are disposed in parallel. Disposing the cameras in parallel, moreover, maintains the optical axes thereof in parallel. Because Robinson shows its cameras as disposed in parallel, we are persuaded that the reference discloses the

limitations of "maintaining the optical axes of a left camera and of a right camera substantially parallel ...." Any teachings of Anderson are merely cumulative regarding the limitation.

The reference also teaches adjusting disparity while adjusting distance to a target object to avoid loss of stereo effect. The appellants admit, "Robinson provides a device which can be adjusted to change camera separation and thus disparity." (Reply Br. at 3.) As mentioned regarding claims 1, 2, 6, 9-11, and 14, Robinson teaches that "[i]t is particularly advantageous to be able to increase the camera base as object distances become greater." Col. 3, ll. 18-20. Furthermore, disparity is controlled to determine the limits of a user's stereo near and far points as follows.

> The left and right marks are first positioned so that they are superimposed. This will appear to give a single image at the surface of the monitor screen. If now the left image is moved to the left and the right image to the right then the single fused image as seen through the viewing spectacles will appear to retreat behind the monitor screen. At some point the disparity between the two marks will be so great that the single image seen by the observer will break up into two separate images. The process may be repeated several times in order to find an average

> value of disparity at which this break-up occurs. This will be the maximum parallax that the observer can tolerate in the image at the far point.
>
> A similar procedure can be adopted to find the near point by separating the marks such that the right image moves to the left and vice versa. The single fused image now appears to advance in front of the monitor screen and eventually this single image will again break up when the disparity between the two marks becomes too great for the observer to fuse them.
>
> The limits of tolerance of fusion thus obtained can then be used in the computer memory in place of the average value of human tolerance of fusion.

Col. 4, l. 59, - col. 5, l. 14.

Because Robinson adjusts disparity while adjusting distance to an object to avoid the break up of the single image into two images, we are persuaded that the teachings from the applied prior art would have suggested the limitations of "adjusting disparity while adjusting distance to a target object to avoid loss of stereo effect." Therefore, we affirm the rejection of claim 5 as being obvious over Robinson in view of Anderson.

CONCLUSION

In summary, the rejection of claims 1-4, 6, 7, and 9-16 under § 103(a) and of claim 8 under § 102(b) is revered. The rejection of claim 5 under § 103(a), however, is affirmed. The affirmance is based only on the arguments made in the briefs. Arguments not made therein are neither before us nor at issue but are considered waived.

No time for taking any action in connected with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART

JAMES D. THOMAS Administrative Patent Judge	)
JOSEPH F. RUGGIERO Administrative Patent Judge	) BOARD OF PATENT) APPEALS) AND) INTERFERENCES
LANCE LEONARD BARRY Administrative Patent Judge	)

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Once signed, forward to Team 3 for mailing.

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APPLICATION NO. 08/483,552

APJ BARRY - **2 copies**

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APJ THOMAS

Prepared By: APJ BARRY

DRAFT SUBMITTED: 15 Aug 02

GJH

FINAL TYPED:

Team 3:

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For any additional reference provided, please prepare PTO 892 and include copy of references